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Telephone Log

Your Name: Walter Weinig
Other Participant(s): Nabil Fayoumi, USEPA
Sandra Bron, IEPA
Initiated by: Nabil Fayoumi

Project/Number: Sauget Area 1 / 4002A
Date: January 28, 2003
Time: 14:00
Subject: Dead Creek ERA response to comments

NOTES:

The purposes of the conference call were to: a) discuss past comments by IEPA and our evaluations of the original draft Dead Creek residual ecological risk assessment (ERA) and EE/CA; and b) review and discuss the Response to Comments documents provided by Solutia in November 2002.

Walter provided an overview of the response to IEPA's questions and comments regarding the original draft EE/CA. The majority of those comments focused on the evaluation of benthic organisms in the context of the Dead Creek residual ERA. Walter described the overall approach used by Pat Billig of Waterstone and Walter to evaluate benthic impacts in the context of the entire aquatic ecosystem. With respect to non-bioaccumulative constituents, it was agreed that 10 times the Probable Effects Concentration (PEC) is a reasonable benchmark for assessing impacts. Some impacts to the benthic community are likely at concentrations lower than 10x the PEC, but this would provide a reasonable framework for evaluating the entire aquatic ecosystem and the role of benthic organisms within the ecosystem. Concentrations above 10x the PEC are more likely to be acutely toxic to benthic organisms, and thus would have an adverse impact on the broader aquatic ecosystem.

We briefly discussed the goals of the restoration project in Dead Creek. We agreed that the goal is to re-establish a viable fish population, and that ecological risk evaluations should be focused on that goal as well as potential bioaccumulative impacts on higher trophic levels. We agreed that this goal had been previously expressed by Solutia's consultants as well.

We discussed the information provided in the Responses to Comments from Solutia dated November 11 and 12, 2002. Solutia provided two separate packages, one dealing with the main text of the Dead Creek EE/CA (Volume 1) and another package dealing with the residual ERA (Volume 3). Major concerns identified in this discussion included:

1. Removal by Solutia of the evaluation of non-bioaccumulative metals from the document. The evaluation of bioaccumulative constituents had been lacking in the original draft, and extensive comments had been provided requesting that this evaluation be added. The removal of the original evaluation of non-bioaccumulative constituents appears to be a mis-interpretation of our previous comments.
2. Lack of any proposed response to elevated metals concentrations other than the eventual effects of natural erosion processes. In particular, further remediation of CS-F Transect 5 due to elevated zinc concentrations was removed from the original draft.
3. Dismissal of creek-bottom soil concentrations exceeding TACO Class 1 Tier 2 soil-to-groundwater remediation objectives. Solutia states in the Response to Comments that no further remediation is needed based on downgradient groundwater data. Sandra pointed out that the substitution of groundwater data for the soil-to-groundwater evaluation is specifically not allowed in TACO regulations, and there is no indication that the wells used in the assessment are appropriately located or constructed. Walter stated that this appeared to be an argument

for natural attenuation, although Solutia's response does not identify this dismissal of any further remedial action explicitly as a natural-attenuation approach.

We agreed that the complete Dead Creek EE/CA and residual ERA should include both bioaccumulative and non-bioaccumulative evaluations. Appropriate response actions should be determined based on both evaluations. We agreed that the argument for no further action, or for monitored natural attenuation, based on the TACO soil-to-groundwater evaluation is premature and not supported by an appropriate level of site data or evaluation. Determination of further remediation requirements will be based on the results of future site assessment work to be completed by Solutia, including but not necessarily limited to the assessment of the nature and extent of DNAPL impacts.

Nabil pointed out that the excavation yardage estimated in the Response to Comments had changed substantially compared to the original draft EE/CA. This appears to be a result of eliminating CS-F Transect 5 from consideration for further remedial action, and inclusion of the shorter CS-D Transect 6. The final estimate of excavation yardage will depend upon the transects eventually requiring further remediation, determined on the basis of both bioaccumulative and non-bioaccumulative evaluations.

We briefly discussed the status of the site-wide EE/CA and RI/FS document. Walter said he has not done any significant work on this document since the draft Revision 2 was produced on September 28, 2001. Sandra said that she had provided comments on that draft to the Corps of Engineers in July 2002. It is not clear whether the September 2001 draft was transmitted to Solutia or not.

ACTION ITEMS:

- Walter to provide comments on Solutia's Response to Comments to USEPA no later than January 31, 2003.
- Nabil and Sandra to discuss timetable for receiving IEPA's comments on the Response to Comments documents.
- Walter to contact Tim Gouger (US Army Corps of Engineers) to determine status of the site-wide EE/CA and RI/FS document.

Review of Responses to Comments on Dead Creek Final Remedy EE/CA (Volume 1) and Ecological Risk Assessment (Volume 3), dated November 11 and 12, 2002

Review Prepared by Laramide Environmental, LLC and Waterstone, Inc., January 29, 2003

1. We appreciate the substantial effort made to respond to comments on the original draft Dead Creek Engineering Evaluation/Cost Analysis (EECA) and residual ecological risk assessment (ERA) document. The additional evaluations presented in the response to comments provide necessary information to arrive at an appropriate final remedy for Dead Creek.
2. Further modifications in response to this review should be incorporated into the main text of the Dead Creek EE/CA (Volume 1) and the ERA (Volume 3) as appropriate to maintain consistency between documents.
3. The evaluation of risks due to bioaccumulative compounds is necessary as outlined in our previous comments to the draft documents. However, nothing in the previous comments either stated or implied that the evaluation should be limited to bioaccumulative compounds. The complete EE/CA and residual ERA should include cleanup goals for both bioaccumulative compounds and other constituents with potential residual risk.

Response to Comments on EE/CA (Volume 1)

4. The original draft EE/CA included a recommendation for additional remediation activities in CS-F Transect 5 due to elevated zinc concentrations. At a minimum, this transect should continue to be included in planning for additional isolation or excavation of creek-bottom soils. Additional transects may need to be considered for further remediation based on elevated metals concentrations.

5. *Page 4, first full paragraph*: Several constituents are identified as exceeding TACO Class 1 Tier 2 soil-to-groundwater remediation objectives. No further action is proposed in the text based on downgradient groundwater sampling results. Insufficient justification for the proposed no further action based on the TACO evaluation is provided. The rationale of using downgradient monitoring to justify no active remediation of the impacted creek-bottom soils is essentially a natural-attenuation approach, which has not been completely evaluated or described in the EE/CA.

6. *Page 14, Section 5.1.5, Short-term Effectiveness of No-action Alternative*: We agree with the statement that the no-action alternative will not mitigate the potential transport of impacted soils through erosion. This will also be true for creek-bottom soils impacted with non-bioaccumulative metals such as zinc, copper, cadmium, and nickel that occur at elevated concentrations in several transects.

7. *Response to Comment #7, Page 24:* The use of arbitrary concentration categories, for example metals concentrations greater than 1000 parts per million, to describe

"the extent of migration" while using site-specific, risk-based concentrations to describe "the extent of impact" remains confusing and inconsistent with usual practice. However, further revisions to the text are not necessary as long as site-specific, risk-based concentrations are clearly used to determine the requirement for further remediation activities.

8. *Response to Comment #10, Pages 27-28*: The evaluation of the interaction between Dead Creek and the shallow alluvial aquifer remains incomplete. No information is provided regarding the elevation of the new bottom of Dead Creek (post-removal action) compared to the range of observed groundwater levels. This evaluation is necessary both to assess potential impacts of groundwater on surface-water bodies and to assess the potential leaching of contaminants from creek-bottom soils to groundwater.

Response to Comments on Residual ERA (Volume 3)

9. *Response to General Comment #1*: The issue here is bounding the uncertainty resulting from the very limited fish data. Because of the limited data, the representativeness of that data is suspect. The solution is to either collect more data (not really an option) or bound the uncertainty (use both average and maximum BSAFs to assess the range of uncertainty and the sensitivity to that parameter). There is not enough information or data to determine the conservativeness of the BSAFs, much less that they are "extremely conservative".

10. *Response to General Comment #2*: Solutia's response is correct. The new text is acceptable.

11. *Response to General Comment #3*: The thoroughness of this response is appreciated. However, some comments on the role of macroinvertebrates in aquatic ecological risk assessment are warranted. The sessile nature of macroinvertebrates (relative to fish) makes the macroinvertebrate community of a river or creek a natural integrator of physical and chemical conditions within that system, in addition to being an important food source. The biological consequences of depleted macroinvertebrate populations are depleted fish and aquatic-dependent bird populations. Thus, a consideration of fish and aquatic wildlife populations needs to consider benthic communities. The last paragraph on Page 4 of the Response Document should be revised to acknowledge this connection.

    Considering macroinvertebrates does not mean that sediment numbers developed for benthos should drive clean up. Solutia's analysis, however, has indicated a potential metals problem that could impair future restoration of the aquatic habitat in Dead Creek, especially given the fact that this analysis is based on post-remediation creek bottom data. Risk managers need to be aware of this issue and plan future remedial action, monitoring requirements, and criteria accordingly. The second full paragraph on Page 5 suggests that restoration of the aquatic habitat in Dead Creek is not a goal. This language should be modified to reflect the agreed-upon goals of the Dead Creek EE/CA project, which have included restoration of a viable fish population.

a. Stream Segment Evaluations & Remediation Goals: The stream segment-specific creek-bottom soil screening evaluation and the inclusion of remediation goals is appropriate and adequate information for risk managers. It does appear, however, that Creek Segments E & F may have a metals accumulation problem that may be the subject of future monitoring, as suggested in the first full sentence on Page 5.

   The fourth paragraph on Page 9 has some problematic language. Whether or not bioaccumulative compounds exceed PECs is somewhat irrelevant, since the greater concern is typically their bioaccumulative effects. In the second sentence, it is unclear why metals "at those concentrations" would be unavailable to biota. Please either revise or delete this paragraph.

b. Pages 9-10, Evaluation of residual metal concentrations: Nickel is identified as occurring at a concentration of 12 times the PEC in Transect 3 of Creek Segment C. The statement that the impacts of this concentration on benthic organisms "may be small in comparison to those due to the presence of residential areas on both creek banks adjacent to this sampling location" is unsubstantiated by any scientific evaluation.

   Reliance on natural erosion processes to provide a clean sediment layer at this or any other location in Dead Creek is not supported by any analysis of potential erosion or re-deposition, or by evaluation of potential upstream sources of clean sediments. Natural erosion of impacted sediments followed by uncontrolled re-deposition at downstream locations is not an acceptable remedial response activity.

   Isolation or removal of creek-bottom soils in Transects 1 and 2 of Creek Segment D (containing zinc at concentrations of 14 and 18 times the PEC) is described as "not considered appropriate" using the same rationale as that for Transect 3 of Creek Segment C. It is likely that natural erosion processes would remove these impacted sediments and re-deposit them in Transect 6. CS-D Transect 6 is identified as a depositional area requiring further remediation based on PCB and dioxin concentrations. The natural erosion processes would thus re-deposit metals-impacted sediments and compromise the long-term effectiveness of the remediation activities in this area.

c. Page 10, second paragraph: Copper, nickel, and zinc are identified at concentrations at 29, 12, and 13 times their respective PECs in Transect 16 of CS-E. The text states, "There is no apparent reason for metals to accumulate in creek bottom soils in this stretch of the Dead Creek channel, which is very narrow (10 feet or less) and 4 to 5 feet deep as a result of sediment removal." The data indicate that these site-related contaminants remain in place following the time-critical removal action, whether the reason is apparent or not. No data or evaluations are presented to indicate that this was not a depositional area prior to the channel being deepened as a result of sediment removal. If this is indeed not a depositional area due to the post-removal channel geometry, natural erosion processes cannot be relied upon to provide a clean sediment layer.

d. Page 10, third paragraph: Cadmium, nickel, and zinc are identified in Transect 5 of CS-F at concentrations of 11 to 33 times the PEC. Again, the argument that natural erosion processes obviate the need for further remediation is not supported by any data or scientific evaluation. In fact, CS-F Transect 5 was recommended for further remediation activities in the original draft EE/CA based on the elevated zinc concentrations. No scientific basis is provided to alter this recommendation.

e. Page 17, top paragraph, second to last sentence: The word "effect" should be changed to "affect." The sentence should read, "Section 4.2.2.1 discusses the factors that affect mercury methylation..."

12. *Response to General Comment #4, Page 27*: As stated before, nothing in previous comments either explicitly or implicitly limited the site-specific evaluation to only bioaccumulative compounds.

13. *Response to General Comment #5:*

a. Section 4.2.1, Page 16, last sentence: See Response to General Comment #1. Use of the maximum BSAF is to address the very limited fish data, not to provide a "conservative upper bound". This value was also observed, just as the average was observed.

b. Section 4.2.2.1, Pages 18-20: As discussed elsewhere, sediment will likely re-accumulate once remediation is complete and TOC will likely increase as well. Thus, conditions for mercury methylation will likely improve with time and it is unlikely that mercury or any of the other metals will decrease over time. Therefore, the site-specific BSAFs calculated by Solutia are appropriate. Please revise these sentences.

Use of the lowest possible literature value for the BSAF (0.33) is not appropriate for two reasons. First, as discussed above, conditions for mercury methylation will likely improve with time and it is unlikely that mercury or any of the other metals will decrease over time. Second, since the site-specific average BSAF ranged from 1.4-13, a BSAF value of approximately 7 would be appropriate for this analysis.

14. *Response to General Comment #6, pages 28-31 (evaluation of leaching potential)* : Several constituents were identified that exceed Class I Tier 1 and Tier 2 remediation objectives as outlined in the state of Illinois' Tiered Approach to Corrective Action Objectives (TACO) process. Downgradient groundwater sampling data were used to justify no further active remediation on the basis of

those exceedances. The justification for no further action based on groundwater sampling in lieu of the TACO evaluation process does not meet TACO regulations and thus does not meet ARARs for the site. Using downgradient groundwater monitoring to determine the potential leaching impacts from creek-bottom soils is essentially a natural attenuation argument which has not been substantiated by appropriate evaluations. Further assessment of the groundwater system, nature of contamination, and attenuative capacity would be necessary to justify this approach. If applicable, a natural attenuation approach for the leaching impact to groundwater would require long-term groundwater monitoring to demonstrate continued effectiveness.

15. *Response to Specific Comment #15*:

a. <u>Section 7.2, Page 34, first sentence</u>: As noted previously, use of the lowest possible literature value for the BSAF is not appropriate for two reasons. First, as discussed above, conditions for mercury methylation will likely improve with time and it is unlikely that concentrations of mercury or any of the other metals will decrease over time. Second, since the site-specific average BSAF ranged from 1.4-13, a BSAF value of approximately 7 would be appropriate for this analysis.

b. <u>Section 7.2, Page 34, third sentence</u>: The maximum site-specific BSAF cited in Table 7-3 is 13, not 4.84. Which is correct?

c. <u>Section 7.2, Page 35, second full sentence</u>: Table 7-4 does not use the maximum site-specific BSAF (i.e., neither the 4.84 cited in the text on Page 34 or the 13 cited in Table 7-3).

d. <u>Section 7.2, Page 35, last sentence of first partial paragraph</u>: This analysis indicates a potential mercury problem, not the inappropriateness of site-specific BSAFs.

e. <u>Section 7.2, Page 35, first full paragraph</u>: Table 7-5 was not included. This paragraph may refer to Table 7-4. Please check the reference and adjust accordingly. The fact that the lowest literature-based BSAF results in no additional remediation of creek-bottom soil is not justification for its use in the analysis.

f. <u>Section 7.2, Page 35, third full paragraph</u>: Monitoring of sediment for metals and bioaccumulative compounds of concern (i.e., as identified in the residual ERA) should be included. Monitoring may be necessary in additional creek segments to evaluate the long-term impacts of elevated metals concentrations in creek-bottom soils that are left in place.

16. *Response to Specific Comment #20, Page 37, indented, new paragraph, last sentence*: Please delete the phrase "as a conservative measure".

Appendix G, Soil-to-Groundwater Evaluation

17. *Page 1, second paragraph, last sentence*: Comments dating back to June 2001 on the Fill Area EE/CA and more recent comments on the Dead Creek EE/CA have emphasized the need to evaluate the hydrologic relationship between Dead Creek and the shallow alluvial aquifer. Although some evaluation of groundwater elevations is provided in the response to comments on Volume 1 of the Dead Creek EE/CA, once again these elevations have not been related to the elevation of the bottom of Dead Creek. Please provide an evaluation relating groundwater elevations to the elevation of Dead Creek in order to avoid making unsubstantiated assumptions regarding the relationship of Dead Creek to alluvial groundwater.

18. *Pages 1-3 and Tables G-1 through G-3, comparison of analytical data to TACO Class 1 Tier 1 soil-to-groundwater (SGW) remediation objectives (RO)*: The initial comparison is performed using the maximum concentrations of constituents detected in creek-bottom soils. This is followed by a second comparison using average concentrations. An appropriately, although not excessively, conservative approach would be to use the 95% Upper Confidence Limit (UCL) concentrations, as was done for the calculation of site-specific, risk-based concentrations in the residual ERA. In the cases where the 95% UCL cannot be calculated, the maximum value should be used.

19. *Page 5, Source Length for Tier 2 calculations*: The source lengths described here and used in the calculations in Attachment A differ from those used elsewhere in the Dead Creek EE/CA. For example, the width of CS-B is described as about 100 feet (30.5 meters) in the original draft EE/CA, but is assumed to be only 15 meters (49 feet) for the purposes of the Tier 2 calculations. CS-D is similarly described as about 100 feet (30.5 meters) wide in the main text of the Dead Creek EE/CA, but only 14 meters (46 feet) wide in the Tier 2 calculations. Consistent values should be used for all calculations in the Dead Creek EE/CA, or specific rationale for differences between calculations should be provided.

20. *Tables G-1 and G-3*: The notation used in the Frequency of Detection column should be described. It is not clear what the three values mean.

21. *Table G-5 and Attachment C*: Fifteen groundwater sampling locations are listed and purported to be upgradient of Dead Creek. Based on Figure 3.2, included as Attachment B, it is clear that DW-MCDO, DW-SCHM, and DW-SETT are in fact upgradient of Dead Creek. DW-WRIG and SGW-2 are near the upgradient edge of Dead Creek as shown on the map. These 5 locations do not represent groundwater conditions downgradient of Dead Creek and should be removed from the evaluation.

22. *Attachment A, Tier 2 Calculations*: Several steps in the TACO Tier 2 calculations require further analysis. The comments below should also be incorporated into the text in Sections 3 and 4 of Appendix G.

23. *Attachment A, Calculation of Dilution Factor (DF), parameter values*:

a. The hydraulic conductivity value is taken as 0.16 centimeters per second (cm/s). This is the value for the Middle Hydrogeologic Unit based on historical measurements, reported in the Sauget Area 1 Remedial Investigation/Feasibility Study (RI/FS). If the thickness of the entire saturated, unconsolidated material is to be considered in the Tier 2 calculations, a more appropriate value of hydraulic conductivity would be about 0.02 cm/s. This is the geometric mean of the historical hydraulic conductivity measurements reported in the RI/FS document for the Shallow, Middle, and Deep Hydrogeologic Units. It is also close to the geometric mean hydraulic conductivity (0.018 cm/s) calculated from 15 slug tests performed in all three hydrostratigraphic units as part of the RI investigation for Sauget Area 1. Note that the hydraulic conductivity for the Shallow Hydrogeologic Unit, within which the majority of the mixing zone can be expected to occur, is on the order of 4×10^{-4} cm/s according to the historical measurements described in the RI/FS report.

b. The hydraulic conductivity value used in the calculation is expressed in terms of meters per day. In order to be consistent with the units for infiltration and the guidance provided by TACO regulations, the hydraulic conductivity should be expressed in meters per year. A value of 0.02 cm/s is equal to approximately 6300 meters per year.

c. The mixing zone depth is assumed to be 98 feet (29.87 meters). This is essentially the entire thickness of the unconsolidated aquifer. The assumption of mixing throughout the entire saturated thickness is not supported by site data and is contrary to the TACO Tier 2 calculation procedures. Equation S25 of Appendix C, Table A should be used to calculate the mixing depth. Using this equation, mixing-zone depths range from 0.77 meters beneath CS-F to 14.45 meters beneath Site M. Equation S25 is:

$$d = \left(0.0112 \bullet L^2\right)^{0.5} + d_a\left[1 - \exp\frac{(-L \bullet I)}{\left(K \bullet i \bullet d_a\right)}\right]$$

24. *Attachment A, Dilution Factor (DF) values*: With the corrections to the parameter values, units of measurement, and methodology described above, and assuming that the source lengths (L) used in the Attachment A calculations are found to be correct, dilution factors will range from 4.15 to 4.22. The corrected DF values should be used for calculating site-specific Tier 2 SGW Remediation Objectives.